

Apparatus for opening and closing windows and doors  
with a window glass lifter and a window glass support

## DE 198 37 560 A1

Col. 2, line 37 to col. 3, line 37:

Due to these measures of the invention, first primarily a simple and reliable adjustment of the window glass on the cable window lifter is achieved. This is because this adjustment is no longer carried out manually, but rather automatically. In detail the invention provides for the window glass, positioned obliquely due to the glass supports being fitted at different "heights", first coming up against the window frame. This takes place at the point of contact, whereby in this respect a contact surface may, of course, be involved. In any case the window glass is first moved up for the purpose of adjustment in the oblique position with respect to the window aperture, and this occurs until it comes up against the window frame at the contact point. Further lifting of the window glass is now not possible because the second glass support, positioned below the contact point, is blocked by the window glass coming up against the window frame.

Only the first glass support can still be moved by means of the drive. The result is that simultaneously the connecting cable pull coupling the two glass supports becomes increasingly tensioned. This connecting cable pull is normally used to transfer the tensile forces applied in each case to one glass support also to the other glass support. For this purpose the cable pull and the connecting cable pull form as it were an N-shape arrangement, as is generally known and described in detail for example in DE-PS 44 26 426. In any case the cable pull is driven further by the drive, also with a single-sided blocked window glass, and rolled up on an associated winding drum, so that the window glass - rotating in the window frame - is aligned up to this blockage by means of the first non-blocked glass support. In other words, the alignment is terminated once the first glass support is blocked.

This blockage is not difficult to detect by means of an evaluation of the drive current for the drive, so that the time point for adjustment termination can be easily determined. At the same time the drive is stopped, to be precise then when the previously obliquely inserted glass has been swivelled so far that it has been completely moved into the window frame, thus perfectly closing the window aperture. In this situation the spring tension device or the eccentric is fixed such that the tension of the connecting cable pull is simultaneously defined in the adjustment position.

Due to the fact that with regard to the connecting cable pull with, as it were, a slack due to the adjustment or due to the alignment of variable tension being used, the connecting cable pull can, once the termination process has terminated, be subjected to the desired tension which is required and necessary for a subsequent actuation of the cable window lifter. All in all, an especially simple adjustment is facilitated, which exhibits the further advantage that the through screw joint provided for fixing the spring tension device or the eccentric can be led to the outside through the door unit carrier, so that additional installation apertures are not needed. Once the door unit carrier has been inserted into the installation opening, a reliable and sealing separation between the dry space and the wet space is obtained in this way. In this connection the appropriate fixing of the screw joint or of the eccentric can in the simplest case occur by applying a screwdriver from the outside. It is also conceivable in this connection that extensions of the connecting cable pull due to ageing can be compensated in this way. The main advantages of the invention are to be found therein.

Col. 4, line 47 to col. 5, line 16:

For the adjustment of the window glass 6 the first glass support 5a is arranged in the window frame 13 according to Fig. 2 in the raising and lowering direction of the window glass 6 (cf. the double arrow H, S in Fig. 2) at a distance  $\Delta x$  from the second glass support 5b at an oblique position of the window glass 6 in comparison to the window aperture 12. These geometric relationships can be seen especially in Fig. 4. The alignment of the window glass 6 then occurs in the course of lifting this window glass 6. Owing to its oblique position, the window glass 6 comes up against the window frame 13 at a contact point B. At the same time the second glass support 5b positioned below the contact point B is blocked. Since the drive 9 is driven in the direction of the arrow for this purpose (lifting the window glass 6), i.e. it pulls the first glass support 5a as it were "upward", the drive 9 does not (yet) switch off. This is because the first glass support 5a can still be moved and in fact to such an extent that the window glass 6 is rotated in the window aperture 12 and namely in the manner indicated by an arrow in Fig. 2.

Due to this rotation the connecting cable pull 8 is tensioned at the same time, because the second glass support 5b is blocked. In parallel to this, the cable pull 7 sags increasingly so that a cable tension device 14 provides a remedy which is only indicated in Fig. 2. The window glass 6 is therefore

aligned by means of the first non-blocked glass support 5a until its blockage. The blockage of this glass support 5a can be easily detected via the evaluated drive current for the drive 9. In any case the connecting cable pull 8 is increasingly tensioned, whereby a spring tension device 15 is correspondingly deflected, as is indicated in Fig. 2 by the initial position shown in dots and dashes and the adjustment end position shown dotted. After the alignment has terminated the spring tension device 15 can be fixed. For this purpose the spring tension device 15 is formed as an eccentric 15 which is placed against the connecting cable pull 8 supported by spring pressure.

*Claim 1:*

1. Motor vehicle door, with a door outer panel (1), with a door inner panel (2) with installation recess (3) for a door unit carrier (4) inserted therein, and with a cable window lifter (5) arranged on the door unit carrier (4) with
  - a) a cable pull (7), which is joined at least to a first and a second raisable and lowerable glass support (5a, 5b) for a window glass (6) fastened thereon,
  - b) a drive (9) operating for reversal on the cable pull (7) and
  - c) a connecting cable pull (8) coupling the two window supports (5a, 5b),

characterised in that

  - the first glass support (5a) in the raising and lowering direction (H, S) of the window glass (6) is arranged in the window frame (13) at a distance ( $\Delta x$ ) from the second glass support (5b) in an oblique position of the window glass (6) with respect to the window aperture (12), wherein
  - as a consequence of the oblique position the window glass (6), for its adjustment in the course of lifting, first comes up against the window frame (13) on one side under blockage of the second glass support (5b) positioned below a contact point (B), wherein furthermore
  - the window glass (6) is aligned by means of the non-blocked first glass support (5a) until its blockage - rotating in the window frame (13), and wherein
  - at the same time the tension in the connecting cable pull (8), increased in this way, is compensated with the aid of a spring tension device (15) which can be fixed after termination of adjustment.